Outstanding Features in

This Month's Issue

Research War Council

Report of recent meeting of the representatives of Government War Agencies and representatives of industry. (See page 4.)

High Strength Rayon

Bomber crews, parachute troops, and other members of our armed forces are now benefiting from the many years of research which led to the development of high-strength rayon. (See page 12.)

Increased Card Speeds

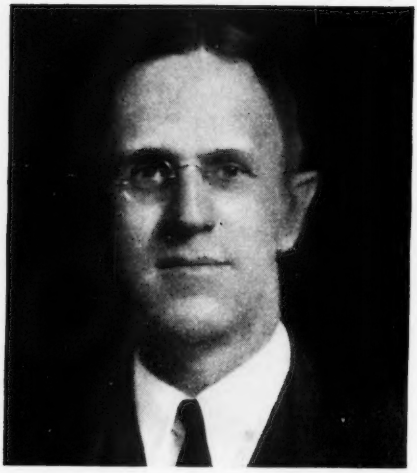
Results of increasing cylinder speeds on cards equipped with metallic clothing bear out conclusions as to the practicability of increasing speed on cotton cards. (See page 18.)

The Ramie Question

If research can solve the problem of decorticating ramie, we have at hand a much needed substitute fiber. (See page 25.)

End the Secrecy

The curfew has tolled on secrecy in research and in processes. (See page 17.)



Fessenden S. Blanchard, president of Textile Research Institute, Inc.

Edward T. Pickard Named Treasurer of Institute, Fessenden S. Blanchard

Full-Time President

ELECTION OF EDWARD T. PICKARD as treasurer, and of Fessenden S. Blanchard as executive secretary in addition to president, was announced by the Textile Research Institute, Inc., last month.

The new arrangement was at the request of Mr. Pickard who has found it necessary, because of continued ill-health, to devote only a part of his time to active business. However, his continuance as executive secretary of the Textile Foundation, plus his association with the Institute as treasurer and member of the executive committee, insures the maintenance of his close identification with the whole textile research movement. It also insures the continuation of the close working arrangement between the Institute and the Foundation.

Mr. Blanchard will give his full time to his work with the Institute as president and executive secretary. He has tendered his resignation to the War Production Board, and will take up his duties at the headquarters of the Institute, 10 East 40th St., New York, on July 1.

In view of the decision of the Institute and of the Foundation to adapt their research work to the war production which resulted in the organization of the Textile Research War Council, Mr. Blanchard's consent to serve in a full-time capacity with the Institute comes at a particularly fortunate time. Mr. Blanchard's intimate association with all branches of the textile work of the War Production Board over the past six months will enable him to continue his important work with the war program.

Harold De Witt Smith, who has been treasurer of the Institute, was elected a vice-president. Fuller E. Callaway, Jr., and Dr. Robert E. Rose are also vice-presidents. These officers, with the following chairman of standing committees, comprise the executive committee: W. D. Appel, Stanley B. Hunt, and Douglas G. Woolf.

Edward T. Pickard, treasurer of Textile Research Institute, Inc., and executive secretary of the Textile Foundation

Plan of Action Formulated
At Technical Conference of

Research War Council

A PLAN OF ACTION for the recently organized Textile Research War Council was discussed at a meeting just held at the Hotel Roosevelt, New York, at which technicians representing all branches of the textile industry met with leaders of the Army, Navy and other Government agencies involved in textile purchasing, and with representatives of the Textile Research Institute, Inc., and the Textile Foundation, co-sponsors of the plan. The technicians had been delegated by associations representing all major branches of the industry.

Specific subjects for quick and timely research to solve problems created by the war emergency were suggested by the various technicians and discussed frankly. This is the first of three stages of the job, the other two being to determine what is being done on these problems and to decide what are the gaps which need particular attention.

In the prosecution of research work on those gaps, the Textile Research War Council is in a position to offer the aid of 14 research men of the Textile Foundation at the Bureau of Standards in Washington, the research facilities of individual mills identified in the movement, and the help and advice of the executives of the textile associations. The aid of our textile school laboratories and personnel has already been offered by the Textile School Deans. Also many private, commercial, and association laboratories have offered their services.

It is the aim of the Council to aid war agencies in

textile problems arising during the present emergency, and to aid the mills in the production of any of the required materials needed for the armed forces, or for necessary civilian use.

Mention was made at the meeting of several existing factors that have been a handicap and that should be corrected; for instance, the widespread duplication of effort; neglecting to take advantage of work in such allied fields as rubber and plastics, a case in point being the progress in the production of laminated fabrics; and secrecy as exists among manufacturers regarding their processes.

Emphasis was laid on the need for an up-to-date tabulation of projects underway and who is working on them. In this connection, obviously, publicity cannot be given to matters of importance to the enemy. Such information will have to remain confidential and for the use of the proper parties. But it is the intention of the Textile Research Institute's new Central Information Bureau to assemble this information and to gather and correlate the results of past research work. It is felt that there is a tremendous amount of valuable data lying buried in the shelves of the technical libraries of the country, in the colleges and research units, and it is the immediate purpose of the Central Information Bureau to search out such information as may have a bearing on current problems. Such material as can be published will be available for general use.

Some of the problems brought up at the meeting as justifying consideration by the Council are as follows:—

a. Mildew-proofing. Many are working on this, but the final answer to some of the problems involved has not been reached.
b. Permanent flame-proofing and elimination of excessive add-on.
c. Gas-proofing.
d. Better substitutes for fibers formerly imported, such as linen and jute—even improving on them.
e. The cordage field needs a better product. A good goal

to shoot at would be a cord half the present diameter with double the present strength and elongation.

f. Always room for improvement in fabrics for aviators suits. Need still more warmth and strength combined with less weight.

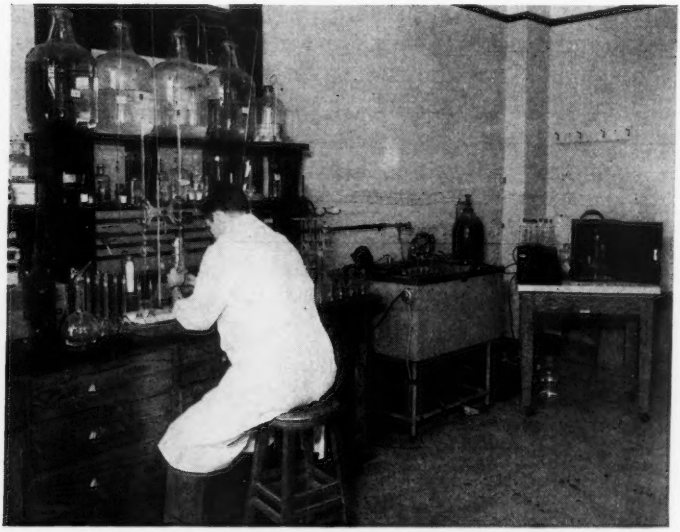
g. Human hair. During the last war some organization made up a fabric of cotton that would stand the pressure and temperature, but no one seems to recall who made it or where.

In civilian fields there needs to be an improvement in luminescent coatings and in some standard of opacity in black-out cloths.

Need a standard "bright," "semi-dull," and "dull" rayon. There is a great variation in these at present.

There is a possibility of saving in use of wool. Who knows what a practical minimum percentage is in a part wool fabric, below which not sufficient warmth is added

Corner of one of the laboratories at the Textile Foundation



to justify its use. Also it is known that the rising curve of warmth flattens out above a certain point.

It was suggested at the meeting that there should be a radical approach, ignoring precedent in research. Nevertheless a knowledge of the ground already covered is important.

Representing the Textile Research Institute were: F. S. Blanchard, president; Dr. Robert E. Rose, vice-president; Dr. Harold DeWitt Smith, treasurer; Stanley B. Hunt, Douglas G. Woolf, Edward T. Pickard, executive secretary, and William D. Appel, members of the executive committee; Dr. Milton Harris, research director; Dr. Charles J. Huber, W. O. Jelleme, Thomas Nelson, Dr. E. R. Schwarz, members of the Technical research committee; and Julian S. Jacobs, editor of TEXTILE RESEARCH.

Representing the various Government agencies were Col. L. O. Grice, Major Frank Steadman, Chandler Robbins, Richard Walton, and Ralph A. Buttland of the Quartermaster Corps; Lieutenant R. G. Buck, of the United States Navy; C. J. Cleary, of the Army Air Force; Capt. F. K. Wilson, Board of Engineers; and Dr. S. J. Kennedy, of the War Production Board.

Textile Associations which had representatives at the meeting included the American Cotton Manufacturers Association, American Society of Mechanical Engineers, Cordage Institute, Cotton-Textile Institute, Cotton Thread Institute, Institute of Carpet Manufacturers of America, National Association of Cotton Manufacturers, National Association of Hosiery Manufacturers, National Association of Wool Manufacturers, National Association of Finishers of Textile Fabrics, National Knitted Outerwear Association, National Cotton Council, Rayon Yarn Producers Group, Textile Fabrics Association. All members of the industry are invited to submit suggestions for war emergency problems for possible study by the Council, to the Textile Research Institute, 10 E. 40th St., New York.

RESEARCH ACTIVITIES

Dr. Milton Harris, director of research for the Textile Research Institute and Textile Foundation, has been appointed chairman of a committee to conduct comparative tests on all present wool fabrics and fabrics employing wool alternates in varying proportions in order to conserve wool wherever possible. Major General Edmund B. Gregory, Quartermaster General, appointed the committee to conduct the study. Its members other than Dr. Harris are Ames Stevens, wool consultant to the War Production Board, and Col. Max Wainer, QMC, chairman of the Quartermaster Board. General Gregory has directed the committee to commence the tests immediately to determine the extent to which conservation of wool may be carried on without seriously lowering present standards of performance in Army clothing and equipage. From such tests, recommendations will be submitted for the modification of existing specifications.

The annual meeting of the American Association of Textile Chemists & Colorists will be held in Atlantic City, Oct. 9 to 11. The theme of the entire meeting will be the textile chemist's contribution to the war effort.

Research anticipated a linen shortage according to a release issued recently by Callaway Mills. When the sources of linen in Europe were abruptly cut off, the need for a suitable substitute for linen cord used in harness fabric became acute among the United Nations. Laboratory technicians at Callaway Mills had for a long time been working on improvements in the quality and physical characteristics of many

of their specialized cotton products, and had already developed a cord made of cotton grown in the United States that would meet Army specifications, and the production of which could be continued without interruption. This cord is being used in various types of aeronautical hose, bomb slings, pilots' belts, gunners' belts, and similar war products requiring an exceptionally tough, strong cord.

Staple fiber from the protein of peanuts rather than from the cellulose of the hulls is reported as a possible new development. The process is covered by patents assigned to Imperial Chemical Industries, Ltd., a corporation of Great Britain. Work is reported as being done in conjunction with Courtaulds, Ltd., in England. The Daily News Record of Thursday, May 21, 1942, gives a description of the process as outlined in the patent.

New protective coatings are needed states the protective coating section of the chemical branch of the War Production Board. Emphasized is the need of new formulae for waterproofing and fireproofing ducks and other fabrics that will make it possible for industry to meet the rigid requirements of the procurement agencies without exhausting the supply of chemicals which are also required for war needs. Ethyl-cellulose and vinyl resins, for example, although imparting the necessary properties to tentage fabrics, are limited in supply and are more urgently needed for other phases of the war program. A number of satisfactory formulae have been developed, a spokesman explained, but all use materials that are, to a greater or lesser extent, limited as to supply and availability for this particular purpose. Consequently, a number of different formulae must

be used, each to be applied to a portion of the processing in quantity proportional to the supply of the particular ingredient used.

"We must give the student a sound foundation in science to enable him to evaluate the work coming out of the research laboratories of the country and also to stimulate his personal interest in research," stated M. Earl Heard, dean of Philadelphia Textile School, in a recent address on American textile education and its future.

Methods of improving the serviceability of hosiery is the subject of a new research project to be undertaken by the Research Committee of the National Association of Hosiery Manufacturers. This study has the two-fold purpose of investigating currently available rayon, and discovering ways of improving serviceability through new or improved fibers, yarns, and fabrics. Swatches of stocking fabric will be knit from these yarns, scoured, treated with finishing agents, and tested for stress-strain relations, resistance to snagging, and abrasion. The best of these fabrics will then be reproduced in the form of stockings and given a service test. Preparation of the special rayon yarn for this research study is now in progress. American Viscose Corp. is furnishing the research associateship at the National Bureau of Standards with this yarn, and it is planned to have this project in full operation by the middle of this month.

Patrick J. Kennedy of E. I. du Pont de Nemours & Co., Inc., has been elected chairman of the New York section of the American Association of Textile Chemists & Colorists.

RESEARCH ACTIVITIES

A new mitten for machine gunners will save the army this year about 300,000 pounds of asbestos cloth, a critical material, according to an announcement by the War Department. The mitten is the result of months of cooperative research between the Quartermaster Corps and the Bureau of Standards. A new type of heat-resistant interlining has been substituted for the original one made of asbestos. It has been proven by tests that a man wearing the new mitten, can hold in his hand for 15 seconds, a steel cylinder approximately the size of a machine gun barrel that has been heated to a temperature of 600 degrees Fahrenheit, thus meeting the rigid Army requirement.

Application of Synthesize, a thermoplastic abietic acid ester, in spun viscose warp sizing is discussed in confidential progress report No. 7 issued to those cooperating in the research on warp sizing being conducted by Textile Research Institute.

"**O**riginal thinking is as important as it ever was, but the old "wizard" of the laboratory has gone," according to an editorial in a recent issue of the New York Times. "Research is now planned and directed. Inspirational inventors like Goodyear, who made 10,000 experiments before he hit on the correct way of vulcanizing rubber, would be a nuisance in an industrial laboratory. The laboratory director who tries every promising plan, in the end arrives at the desired result more surely and rapidly than by testing hunches in a haphazard way. It is the purpose of well planned research to test relationships, whereupon a new discovery or invention follows."

An Outstanding Achievement Of Applied Research Is

High-Strength Rayon

BOMBER CREWS, PARACHUTE TROOPS, and other members of our armed forces are benefiting from the many years of research which led to the development of high-strength rayon. Brought to a commercial stage in 1937, high-strength rayon was quickly adopted for manufacture of cords for heavy-duty tires for trucks and buses. Later it began to be employed in the fabrication of textiles for various industrial, household, and apparel uses. Then came the war; and the entire output of high-strength rayon was quickly diverted to war purposes.

Born of research, the rayon industry has continued throughout its existence to pour back a sizable part of its profits into further fundamental and applied research. As the low tensile strength of rayon, particularly when wet, was one of its most serious drawbacks, much of the research effort was naturally diverted toward improvement in that direction.

Some of the outstanding fundamental work was done by L. Lillienfeld in Austria, and Heberlein in Switzerland. The Lillienfeld process was brought out in the early 1920's and depended essentially on the discovery that stretch applied to the filaments while still in the plastic state enhanced the strength to a marked degree. And the patents taken out by Heberlein, A. G. disclose that this company was applying to the problem its experience gained in the mercerization of cotton through the use of concentrated solutions of sulphuric acid in the coagulation

process. There was an argument between Ross and Lillienfeld in 1930 as to whether patents of other investigators might not have antidated the latter's, indicating widespread efforts to improve the new fiber.

One great difficulty encountered was in the matter of the elasticity and also the difficulty in the dyeing of material so treated. A great deal of publicity was given to the Lillenfeld process and its revolutionary accomplishment, but it was not until the year 1937 that high-strength rayon yarn was ready for commercial production. In that year both Du Pont and American Viscose in this country were producing high-strength rayon in quantity, with

Amba brought out in Italy. Courtaulds, in England was also actively working on high-strength viscose. North American and possibly other companies are now in production. Celanese Corp. has pioneered in development of high-strength acetate rayon.

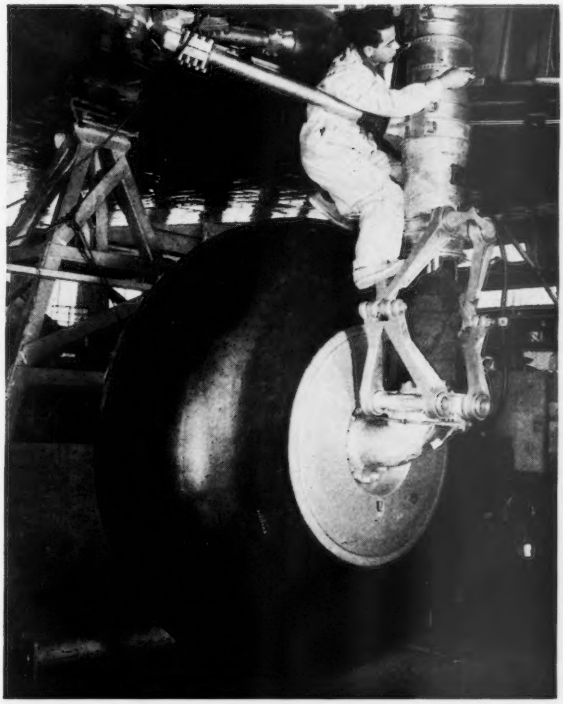
The basic principle used by different concerns for producing strong rayon is the same, but each company has had to work out its own method of making the process successful. These methods and kinks are closely held, though it would seem as if perhaps the Japs were familiar with all of them. A recent report given out from Japan asserts that they have successfully produced a high-strength rayon, going us one better, having made substantial improvements on our processes.

A comparison of strengths shows that methods of producing the new rayon have nearly doubled the tensile strength in the case of viscose rayon with a satisfactory elongation, whereas with acetate rayon a much greater increase in strength is noted but with a drop in elongation. High-strength viscose rayon is generally produced with a tensile strength of between 3 and 4 grams per denier as against 2 grams per denier for the regular; the wet tensile strength as 2.1 to 2.2 grams per denier as against 1 gram per denier for the regular. The dry elongation of viscose rayon of the strength mentioned above is reported to run from 9 to 17 per cent with the wet elongation from 18 to 21 per cent. Higher strengths can be produced but at the expense of elongation. Acetate rayon is reported to have been developed with a dry tensile strength as high as 6.8 grams per denier and as high as 5.6 grams per denier wet, with an elongation of 7 per cent.

The remarkable strength of the yarns produced from these new rayons coupled with the fact that much less heat develops from the continued flexing made them superior cord for tire fabrics, and, as noted above, the early development of use for it was in this field. It has made possible higher speeds in the transportation of heavy loads and given demonstration of ability to withstand shock,

thus making it satisfactory for artillery mounts and other automotive transportation over the rough terrain encountered in carrying on war campaigns. One principal reason for the use of high-strength rayon in construction of tires for heavy bombers, is because it withstands the strain and shock of landing and take off with heavy loads. It has been proved that rayon tire cords show even greater strength under sudden application of the load than when it is gradually applied. Some records of extremely long mileage from heavy bus and truck transportation have also been had, and thinner side walls with less rubber required, and longer life for the rubber are added features. For parachutes, again

Tire for 82-ton Douglas bomber contains nearly 150 miles of high-strength rayon cord



strength in relation to weight is an essential requirement, and of course it is known that the ability to give or elongate is a vital factor in absorbing the shock of any load suddenly applied. A given cord will buckle under the strain of a shock load when another cord of less tensile strength but greater elasticity will hold.

There is room for still further improvement in the matter of elasticity, and it is asserted that the greater extensibility of other rayons make them more satisfactory for flare chutes and some ordinance purposes. Also it is wasteful to use the comparatively limited present production for such purposes as self-sealing gas tanks where another type will do, since it is estimated that for the requirements of motor transport alone over 100 million pounds of high strength rayon will be needed this year.

There are many other uses for this type of rayon in our war economy, some of which are now a success and some of which are in process of development. Among these are fabrics for work clothes and uniforms, and especially for such requirements as parachute troop uniforms and light-weight uniforms for use in the bush and jungle, because of its strength and resistance to snagging.

The successful development of this man made fiber could not have been possible without diligent research both fundamental and applied, and continued research will bring the needed improvements. As a concrete illustration of the part played by fundamental research, for instance, is the discovery through studies already completed and now being carried out that the orientation of the molecular chain or micelles of the fiber structure is important to the strength and flexibility. If the micelles in center of the fiber can be oriented lengthwise and the outside more laterally inclined, greater flexibility and extensibility would be the result, along with the increased strength.

It seems a certainty that much further development will occur, some in the matter of improvement in the fiber and much in its adaptation to new uses.

End the Secrecy

AN EDITORIAL

► From the days of Tubal Cain, "the first known artificer or cunning worker in metals," up to a generation ago, progress was slow in applying the fundamentals wrung from nature by workers in science, largely because secrets were handed down from father to son and kept within trade associations. Even today textile firms, in particular, closely guard many processes.

► It required the catastrophe of the war of 1870 to waken Germany to the possibilities inherent in group research. As a result she established the Reichsanstalt with two divisions—one to engage in fundamental research, and the other to apply the findings for the benefit of German industry and manufacture. Technical colleges were established and great chemical firms were built up. In England and America progress was somewhat slower, until the catastrophe of the first world war so accelerated the pace that by 1939 it was estimated that in this country over 30,000 scientists and engineers were engaged in research.

► Now the CATASTROPHE of the second WORLD WAR. And we find it necessary not only to meet unforseen technical requirements, but to find substitutes for many hitherto plentiful textile raw materials.

► The NEXT STEP in progress obviously seems to lie in the direction of more effective collaboration and exchange of so-called secret processes. The way must be found to overcome the apparent obstacles to this ideal.

Julian H. Jacobs

Additional Tests Indicate The Practicability of

Increased Card Speeds

By GEORGE H. DUNLAP

Results of increasing cylinder speed of cotton cards equipped with regular wire clothing were reported in the April, 1942, issue of TEXTILE RESEARCH. *Following is a supplementary report covering results in a mill having cards equipped with metallic clothing. These tests comprise part of the practical research which is being carried out by the Southern Textile Association and the Arkwrights under sponsorship of the Textile Foundation, Professor Dunlap is research supervisor.*

IN AN EFFORT to meet the demand for the textile production necessary both for civilian consumers and for our armed forces, numerous textile plants are now experimenting with increased card cylinder speed. Many mills scattered over a wide area are giving this problem a thorough and extensive trial. In general, these experiments have upheld the practicability of such increased speeds. Numerous plants have reported to date excellent results obtained without encountering mechanical difficulties. These cooperating mills are releasing their results to the writer for publication as soon as they feel that their findings are reasonably conclusive.

The data presented in a condensed form in the following tables are the results of the experimentation of one of these cooperating plants. The writer takes this opportunity to commend the mill on the completeness of the

report which covered every phase of the test. Its length, however, prohibits the release of the entire contents.

This test, in which thousands of pounds of cotton were processed, was conducted over a period of several months. The mill reported excellent running conditions and no mechanical trouble. The cotton tested was of the same grade and staple and was manufactured under similar mechanical conditions, the only variable being the card cylinder speed. Classification of the test cottons and the mechanical organization used are given in Table I, and Table II presents the test results in terms of waste, sliver variation, ends down and breaking strength of yarns and fabric. Each skein breaking strength of the yarn was based upon 50 breaks, while each single strand breaking strength listed was based upon 4 strands from each of 16 bobbins—a total of 64 breaks.

Of course no one test is conclusive; however, a study of the data in Table II shows the waste content and strength of yarn varied little as between normal and high card cylinder speeds. In other words, this particular plant, by increasing card speeds, has succeeded in increasing its production without a sacrifice of quality.

This particular test was conducted on cards equipped with metallic clothing. On a similar test run on regular wire clothing Mill A at cylinder speeds of 165 and 192 r.p.m. respectively had a waste content of 5.35 and 5.137 per cent. Mill B at speeds of 172 and 196, respectively, had a waste content of 4.962 and 4.371 per cent. In the test presented here the percentages of waste were 3.45 and 3.385, respectively, at cylinder speeds of 160 and 190.

It is suggested that excessive speeds be tried with caution. In such a test the condition of the machine is an important factor. A card in a poor state of repair cannot stand an appreciable increase in speed. Whenever speed becomes great enough to injure quality, the advantage of this increased production becomes doubtful. Some mills, upon attaining increased production by higher card speeds, are dissatisfied because tensile strength is

Table I. Test conditions

R.P.M. of cylinder	160	190
Staple of cotton	1 in.	1 in.
Grade of cotton	S.L.M.	S.L.M.
Blend	80% western 20% local	80% western 20% local
Bales per mix	42	42
Pounds used in test	26,208	35,154
Cards:		
Relative humidity	49%	49%
Stripping schedule	None	None
Ounce lap fed	14	14
Actual grain sliver delivered	58.25	57.99
Pounds carded per hour	11.33	13.50
Model card (year)	1910	1910
Age of clothing	3 yr.	3 yr.
R.P.M. of lickerin	430	511
Front plate settings:		
Top	0.034	0.034
Bottom	0.017	0.017
Clothing of cards	Metallic	Metallic
Drawing frames:		
Type	Regular	Regular
Processes	2	2
R.P.M. of front roll:		
Breaker	381	381
Finisher	381	381
Top rolls	Metallic	Metallic
Roving frames:		
Processes	1	1
Hank roving made	3.00 3.50 5.00	3.00 3.50 5.00
Type	Super draft	Super draft
Spinning frames:		
Type	Long draft	Long draft
Top rolls	Calf skin	Calf skin
Doublings	2	2
Counts spun	25s warp 31s warp 39s filling	25s warp 31s warp 39s filling
25s warp:		
R.P.M. of spindle	10,400 high 9,500 low	10,400 high 9,500 low
R.P.M. of front roll	139 high 127 low	139 high 127 low
Ring diameter	1.75 in.	1.75 in.
31s warp:		
R.P.M. of spindle	10,400 high 9,500 low	10,400 high 9,500 low
R.P.M. of front roll	124 high 113 low	124 high 113 low
Ring diameter	1.75 in.	1.75 in.
39s filling:		
R.P.M. of spindle	9,063	9,063
R.P.M. of front roll	124	124
Ring diameter	1.4375 in.	1.4375 in.

Table II. Test results

	Per cent	Per cent
Card waste:		
Motes and fly	1.286	1.416
Cylinder and doffer strips	None	None
Flat strips	2.110	1.902
Front fly	0.054	0.067
Total waste	3.450	3.385
Nep count in web (area of 35 sq. in.)	21.50	15.44
Sliver variation:	Per cent	Per cent
Card:		
Avg. max. var. per yd.	9.46	8.69
Max. var. in 20 yd.	15.51	15.26
Breaker drawing:		
Avg. max. var. per yd.	27.51	25.00
Finisher drawing:		
Avg. max. var. per yd.	33.27	29.49
Ends down per M spindles per hour:		
25s warp	25.57	24.31
31s warp	21.20	28.36
39s filling	20.83	20.49
Breaking strength of yarns:	Pounds	Pounds
25s warp:		
Tensile strength (skein)	73.600	73.800
Tensile strength (single str.)	0.628	0.640
31s warp:		
Tensile strength (skein)	60.100	59.600
Tensile strength (single str.)	0.507	0.486
39s filling:		
Tensile strength (skein)	44.900	44.300
Tensile strength (single str.)	0.385	0.375
Grade of yarn:		
25s warp	B	B
31s warp	B	B
39s filling	C+	C+
Breaking strength of cloth (grab method):	Pounds	Pounds
48 × 48, 25s warp, 25s filling:		
Warp	40.40	44.70
Filling	36.60	37.30
56 × 52, 31s warp, 39s filling:		
Warp	40.40	39.00
Filling	27.70	28.00

not increased likewise. This greater strength of yarn is a worthy objective but increased production with the same strength is a big step forward. The recent order of the War Production Board which changed over many of the textile plants to manufacture defense goods in many instances will necessitate their spinning coarser numbers than heretofore.

RESEARCH AIDS

Chemical Dictionary

The third edition completely revised and enlarged of the well-known "Condensed Chemical Dictionary" * is now available. Over 6,000 new items have been added. They comprise chemicals, mothproofing agents, hydrogenated products, and many others. The feature of encyclopedia-type definitions has been retained, many new ones added, and all items brought up to date. An added feature is the inclusion of a large number of chemical specialties, sold under trade or brand names. Another new feature is the inclusion of typical specifications, describing the product as marketed and sold commercially.

* CONDENSED CHEMICAL DICTIONARY; *Reinhold Publishing Co., 330 West 42nd St., New York; $12.*

A Glance at Tomorrow

On the war front, American science is in the vanguard, devising the most potent weapons ever known, making the country safer at home by finding new ways of producing vital materials, planning to provide us with a gasoline supply that will last 3,000 years rather than 30, making advances in the field of agriculture to guarantee food supplies, guarding the strength and morale of our armed forces by new work in the fields of diet, medicine, and surgery. On the peace front, American science is doing even greater things, making discoveries that stagger the imagination. In the world of plants, in the far reaches of the heavens, in the newly discovered universe of the atom, in the brains and bodies of men, scientists are finding answers to age-old mysteries of human life. They are achieving results which could not have been foretold even a few years ago.

In "The Men Who Make the Future" * Bruce Bliven tells this story of what American scientists are doing to-

day and what the results of their research will mean to us tomorrow. For about a year the author spent much of his time talking with leading American scientists—chemists, physicists, physiologists, botanists, engineers, and others. This book is primarily the product of these interviews. Giving a comprehensive and comprehendable picture of the work which is being done in research laboratories throughout the nation, it provides a glimpse of the better world to come. Despite his overemphasis of some relatively minor development and under emphasis of some more important achievements, the author succeeds in giving a fairly well-balanced summary of the scientific advances which are occurring on all fronts.

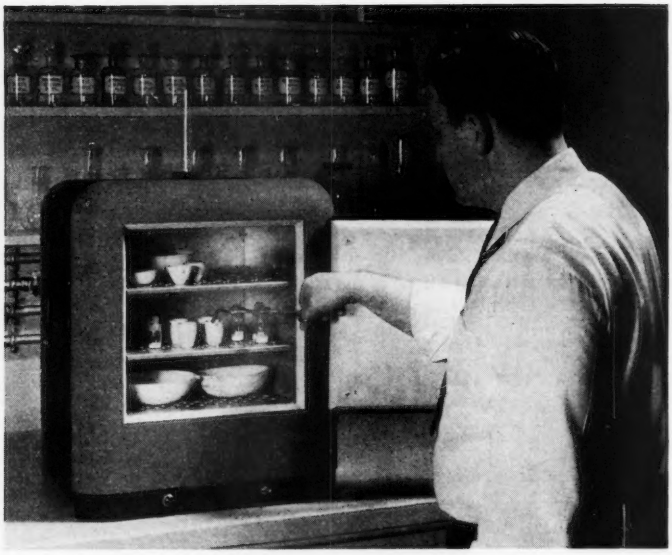
* THE MEN WHO MAKE THE FUTURE; *Bruce Bliven; Duell Sloan & Pearce, 270 Madison Ave., New York; $2.50.*

New Set for pH Testing

A simplified testing set for acidity and alkalinity control, accurate for any half unit from pH 3 to pH 11, has been introduced recently. This set is designed for control tests in the plant by unskilled workmen; also for quick, preliminary tests in laboratories where more elaborate pH apparatus is available. The set, consisting of two units—a Buffer Set for seventeen solutions of known pH value, and a dispenser with a supply of Hydrion test paper—can be obtained from R. P. Cargille, 118 Liberty St., New York.

Uniform Temperature Oven

The chief advantages claimed for the new Isotemp oven developed by the Fisher Scientific Co. are uniformity of temperature throughout the oven, constancy of temperature (in respect to time), and valuable safety features. Complete description with structural details is to be found in the trade booklet, "The Laboratory," which can



Uniform-Temperature Oven

be obtained from either Fisher Scientific Co., 711 Forbes St., Pittsburgh, Pa., or from Eimer and Amend, 633 Greenwich St., New York.

Abstract Service

An abstract service devoted to the complete field of synthetic resins, rubbers and plastics, including the scientific aspects of cellulose and fiber chemistry is now available. These abstracts are sufficiently comprehensive, giving most of the data and facts of the original paper and reproducing important graphs as to frequently make it unnecessary to consult the original literature for reference. The abstracts are in loose leaf form with binder and a simple system for filing for ready reference. The service is published by Interscience Publishers, Inc., 215 Fourth Ave., New York.

Critical Survey Throws New Light On

The Ramie Question

Thus far the problem of decorticating ramie and yucca without rendering the fibers brittle and tender has remained unsolved. If research can solve this problem, we shall have at hand a much-needed substitute for certain fibers which now are sadly lacking. Therefore a recent publication of the Louisiana State University Press, Baton Rouge, La., should be widely read. This publication, "Ramie: A Critical Survey of Facts Concerning the Fiber-Bearing Plant URTICA NIVEA*" was written by Dr. G. L. Carter, and Dr. Paul M. Horton, of the Institute of Industrial Research. It contains tables and detailed studies of the properties, uses, growing, harvesting, and purification of the raw material, and complete bibliography of the literature pertaining to ramie. Following is a brief abstract of some of the studies and conclusions.*

ALTHOUGH RAMIE HAS LONG BEEN KNOWN and periodically discussed as a possible textile fiber, it has never assumed a position of importance in this field. In the past considerable amounts of money have been spent unsuccessfully in trying to establish a ramie industry in this country. Failure of these enterprises has been attributed to various causes. The literature concerning this fiber is not reliable and contains much information that is untrue, there being many contradictory statements.

This investigation has been conducted with the purpose of determining the exact status of ramie, in order that in the future a source of reliable information will be

Properties of Ramie Relative to Other Fibers

	Ramie	Flax	Cotton	Hemp	Silk
Tensile strength	100	25	12	36	13
Elasticity	100	66	100	75	400
Torsion	100	80	400	95	600

available to anyone desiring to attempt to establish a ramie industry in this country. Particular study has been given to the parts of the problem about which there are conflicting statements in the literature or about which no information is available. Attention has been paid to yields of fiber per acre, factors affecting yields, stripping of the ribbons from the stalk, purification of the ribbons and the economics of production and purification of the fiber.

A few individuals are inclined to believe that the production of ramie in countries where hand labor is relatively costly is not economically feasible, due to the low cost of imported China grass; i.e., ramie fiber from which the bark and a part of the gums have been removed by hand scraping. Many textile experts assert that the difficulty lies in not being able to remove the gums from the raw fiber without simultaneously injuring its strength and luster. Others think it is difficult to spin properly; yet there have been plants operated in which the fiber was successfully degummed and spun. A small but active group believes the failure has been due to the fact that in many cases the experimental and development work has not been in the hands of technically minded people.

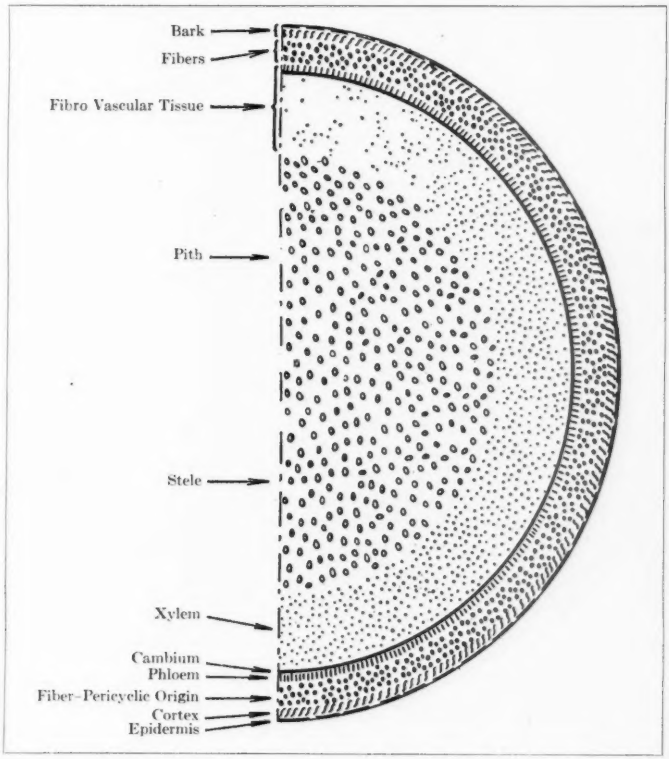
The fiber obtained from ramie has many qualities that make it desirable as an industrial raw material. Among the advantages cited for ramie are its strength, luster, wear resistance, large yields per acre, and ease of propagation and cultivation. Ramie is one of the strongest vegetable fibers known, as can be seen from the accompanying table. It has a luster only a little less than silk and it is reported that a mixture of 20 per cent ramie

in silk cannot be detected by the average person.

Because of its high tensile strength and resistance to moisture, 50 per cent mixed with wool decreases the shrinkage from 25 to less than 10 per cent. Fabric made from ramie is said to be cooler than cotton, and warmer but thinner than linen.

Ramie is native to the orient, where it has been cultivated for many years. The plant grows to a height of 3 to 6 feet and matures in from seven to twelve weeks depending on the climate; and the stalks can be harvested several times a year, as new stalks spring up after each

Cross-section of ramie stalk



cutting. Is subject to very few insect pests. In Louisiana it matures in 50 to 60 days yielding a weight of pure fiber from topped and deleaved stalks of approximately 12 per cent figured on a bone-dry basis.

The main cost of ramie fiber does not lie in the production itself, but rather in the decortication and purification preliminary to shipping. This is done in China, presumably by the entire family at practically no cost.

The cost of growing and maintaining one acre of Ramie at Louisiana State University was $27.50 for the first year, and $12 for the second and each succeeding year; and it is concluded that land can be made to produce as high as 25 tons of green plants per acre containing approximately 500 pounds of pure fiber each year.

Methods of degumming are all "secret" and closely guarded. In one process said to have been used on a large scale, the fibers are first softened by a treatment at 100° C. with an emulsifying agent containing a soap of oleic acid, coconut, and olive oil. The fibers are then twice boiled with dilute caustic at 130° C., followed by washing. Detailed study discovered that strong alkali could be used to produce a fiber of good quality if certain precautions were rigidly observed.

Ramie can be grown in the gulf coast states with little difficulty. In order to compete with imported China grass at 10 cents a pound, the unpurified domestic ribbons must be produced to sell for less than 5.7 cents per pound. The cost of cultivating, fertilizing, and harvesting ramie in Louisiana has been found to be 1.82 cents per pound of raw ribbons. This leaves a margin of 3.88 cents per pound with which to take care of the profit to the grower and the cost of removing the ribbons from the stalks. Use of hand labor to perform this operation is out of the question in countries having high labor charges. In order to introduce the culture of ramie into this country on a commercial scale it will be necessary to perfect a mechanical method of separating the stalk from the ribbons without mechanical injury to the fibers.

Government and College Confer Honors on

Franklin W. Hobbs

FRANKLIN W. HOBBS, president of Arlington Mills, Lawrence, Mass., received recognition last month in Government and educational circles. He was reappointed a director of the Textile Foundation by President Roosevelt and had conferred on him the honorary degree of Doctor of Science by President Moody, of Middlebury College. This is the fourth time Mr. Hobbs has received the appointment for a term of four years as director of the Foundation—the last three of such appointments having been made by President Roosevelt. He was appointed for the first time by ex-President Hoover, and for the thirteenth time has been elected chairman of the board of directors of the Foundation at its annual meeting.

Franklin W. Hobbs, president of Arlington Mills, and director of the Textile Foundation.

RESEARCH BRIEFS

► Three types of finishes needed in the production of war-time fabrics are described by C. E. Salkeld, in an article "Some Modern War-Time Finishes," in the February, 1942, issue of *Journal of the Society of Dyers & Colourists.* The author describes formulas and methods and points the way to further studies.

► The story of the culmination of 40 years of research in cotton breeding by the Delta Experiment Station and the growers of cotton, is told in an article "Cotton Breeding Research Pays Off," by Mildred G. Barnwell, in the May, 1942, issue of *Textile World.* This year the Delta with its million acres of rich, alluvial cotton land is planting 80% of its crop in staples 1⅛ in. and over—those most needed for war effort.

► The phenomenon of creep under load and creep following removal of the load is described by Herbert Leaderman, in an article "Plastics and the Time Factor," in the May 11, 1942, issue of *American Dyestuff Reporter.* The article is a review of work carried out at the Textile Laboratory, Massachusetts Institute of Technology under the direction of Mr. Leaderman, who is research assistant, Textile Foundation program.

► Application of infra-red rays to problems of the textile colorist is discussed by Dr. Julius Grant in an article "Infra-Red and Their Applications to Problems of the Colorist," appearing in the May, 1942, issue of *Textile Colorist.* It has been found that infra-red rays exhibit a selectivity when directed on to certain

substances (e.g., fabrics, fibers, dyes, or other colors) that offers a means of identifying the substance concerned. A description of a recent development of a method is the so-called "Plantnikow effect." The technique involved in the identification of dyes is simpler than the ultra-violet method and many textiles allow the passage of infra-red rays, so that colors may be examined without the necesity of removing them from the textiles on which they occur.

► Effect of perspiration on dyed cotton goods is discussed by F. Jardinson, in an article "Action of Sweat on Dyed Cotton Goods," in the May, 1942, issue of *Textile Colorist*. The fastness to perspiration of different types of dyes is given and caution advised in the selection and excessive use of direct or even basic dyes for shading or toning the dyeings. Formulas are given for perspiration solutions for test purposes. The original report appeared in the *Indian Textile Journal*.

► Printing of Nylon is discussed by Paul L. Meisnier, of E. I. du Pont de Nemours & Co., in an article "The Printing of Nylon Fabrics," in the May 11, 1942, issue of *American Dyestuff Reporter*. The author reports the results of an extensive investigation to determine the affinity and light fastness of a wide range of acid, direct, acetate rayon, chrome, vat, basic, leuco vat, azoic, and oxidation colors used for printing on Nylon with the aid of various assistants.

► Modern theories of dyeing with acid dyes is the subject of the fourth of a series of articles on modern practice of wool dyeing, by C. L. Bird, F.I.C., in the

April issue of *Textile Recorder*. The article is technical and discusses the theories and findings of Donnan, Elöd, Valko, and others.

► Acetylation of cellulose under various conditions is discussed in an article "The Reactions of Cellulose-III," in the April, 1942, issue of *Silk & Rayon*. Article outlines commercial process for producing cellulose acetate and gives chemical reactions involved.

► A new theory as to the underlying reason for crimp in wool is set forth by Aldred F. Barker, F.T.I., in an article "Cause of Crimp in Wool," in the May, 1942, issue of *Textile World*. The theory proposed is that crimp is due mainly to the varying rates of growth of the fibers composing the wool staple.

► A study of the influence of varying degrees of color blindness as it affects the matching of colors in dyeings of textiles, is given by W. Garner in an article, "Color Matching and Color Blindness," appearing in the April, 1942, issue of *The Journal of the Society of Dyers and Colourists*. The article reviews four principal groups of factors involved—(1) The composition of light falling on the pattern. (2) The composition of the light reflected from the pattern when illuminated by north daylight. (3) The physiological factors due to the structure of the viewing eye. (4) Psychological factors. An interesting point brought out is the effect of the age of the person matching colors. The matchings of a young person would probably not satisfy a much older dyer, thus causing confusion, and that a filter had been devised to enable the young dyer to see the color in the same way as the older man.